Applications Session

Scenario Based Mapping of Dynamic Applications on MPSoC: A 3D Graphics Case Study

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Abstract

Modern multimedia applications are becoming increasingly dynamic. The state-of-the-art scalable 3D graphics algorithms are able to adapt at run-time their hardware resource allocation requests according to input, resource availability and a number of quality metrics. Additionally, the resource management mechanisms are becoming more dynamic themselves and are able to cope efficiently at run-time with these varying resource requests, available hardware resources and competing requests from other applications.

Multi-resolution frameworks are needed, where the object's quality dynamically adapts to the viewing conditions while respecting constraints such as available hardware platform resources The scalable 3D graphics application is the implementation of a game engine based on optimized Wavelet Subdivision Surfaces (WSS) algorithm. Based on the user-commands (Ex: Move forward, Move backward, rotate, pitch, yaw, etc...), the best triangle budget and the related Level Of Detail (LOD) settings for each visible object will be decided at run-time(online). In the game example there is a input representing 3 rooms (R1, R2 and R3), where in each room there will be some objects (e.g., some fruits on a bowl). There are 4 cameras fixed in each room to see the objects from different angles. As an in-game character enters from one room after another the best camera position will be chosen by the application controller according to the in-game cinematic effects and user commands. The traditional Worst case estimation approach for the resource management, can not be applied for this application as the amount of resource requests varies due to high variation in the no.of objects(1 to 1000) and no.of triangles(100 to 1M).

In this poster, we will show the dynamic resource requests of the Wavelet Subdivision Surfaces (WSS) based scalable 3D graphics application. We also show how to map its computational resource requests at run-time with the use of the Task Concurrency Management (TCM) methodology and the System Scenario based approach on MPSoC platform with very heterogeneous Processing Elements (including RISC, VLIW and FPGA accelerator resources).